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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/769,252	01/30/2004	David Keller	200207762	8154

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EXAMINER

FIDLER, SHELBY LEE

ART UNIT	PAPER NUMBER
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2861

DATE MAILED: 11/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/769,252

Applicant(s)

KELLER ET AL.

Examiner

Shelby Fidler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 10, 12-19, 21, 23-31, 36, 41, 42 and 44 is/are pending in the application.
- 4a) Of the above claim(s) 2, 3, 5, 13, 14, 16, 24 and 26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 4, 8, 10, 12, 15, 19, 21, 23, 25, 29-31, 36, 41, 42 and 44 is/are rejected.
- 7) ☒ Claim(s) 6, 7, 17, 18, 27 and 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 1/30/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Oath/Declaration

The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

The full name of each inventor (family name and at least one given name together with any initial) has not been set forth.

Please note that the second named inventor is missing letters within the name.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 4, 15, 23, 25, and 36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding claims 4, 15, 25, and 36, these claims recite that "the predetermined intended distribution is based on a normal distribution of nozzle sizes." Regarding claim 23, this claim recites that the nozzles are "configured with various intended sizes, wherein the intended sizes of each nozzle is selected according to a predetermined intended distribution that defines at least a boundary interval of intended nozzles sizes and a probability distribution of intended nozzle sizes." These limitations merely recite that the nozzles on a printhead die are intended to have a certain structure, as opposed to the nozzles actually having a certain structure. Therefore, these claims lack the structural limitations

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necessary to properly examine the apparatus as claimed. For the purpose of rejection, Examiner treated all "intended limitations" as limitations that would include the structural aspects that were intended.

Claim 31 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim recites that "an intended drop volume of printing fluid ejected from each nozzle is derived from a predetermined intended distribution." This limitation merely recites that the each nozzle is intended to eject a certain volume that is derived from an intended distribution, as opposed to the nozzles actually ejecting a certain volume that is derived from an actual distribution. Therefore, this claim lacks the structural limitations necessary to properly examine the apparatus as claimed.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 12, and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Lesniak (US 5387976).

Regarding claims 1 and 12:

Lesniak discloses a fluid ejection device comprising:

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a die (ink-jet printhead 40) including a plurality of nozzles (nozzles 42) variously configured according to a predetermined distribution (the distribution shown in Fig. 5), the plurality of nozzles having a target mean drop volume (desired drop-volume) and an actual mean drop volume (inherent drop-volume); and

a controller (ink-jet printhead controller 62) configured to set the actual mean drop volume provided by the plurality of nozzles to the target mean drop volume (col. 7, lines 62-67) by selectively firing selected nozzles (col. 8, lines 2-6 show that each drop is modified during printing; col. 4, lines 41-44 show that nozzles are selectively driven during printing; thus the nozzles that are selectively driven during printing are all modified).

Regarding claim 31:

Lesniak discloses all the limitation of claim 12 that apply to claim 31 as well as the limitation that the drop volume of printing fluid ejected from each nozzle is derived from a predetermined distribution (this is inherent to Lesniak's nozzles of col. 4, lines 5-8).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lesniak in view of Raman et al. (US 6655755 B1).

Regarding claims 4 and 15:

Lesniak discloses all claimed limitations except that the nozzles are configured according to a normal distribution of nozzles sizes.

However, Raman et al. disclose that it is common for inkjet printheads to have nozzles configured according to a normal distribution of nozzle sizes (col. 2, lines 55-58 and Fig. 1).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to provide nozzles that are configured according to a normal distribution of nozzle sizes into the invention of Lesniak. The motivation for doing so, as taught by Raman et al., is to produce the printhead in high volume (col. 2, lines 52-58).

Claims 8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lesniak in view of Mackenzie et al. (US 6808241 B2).

Regarding claims 8 and 19:

Lesniak discloses all claimed limitations except that the controller is configured to set the actual mean drop volume of the die to the target mean drop volume by selectively firing some nozzles of a subset of commonly sized nozzles.

However, Mackenzie et al. disclose setting an actual mean drop volume of the die to a target mean drop volume (1-2 nanograms; col. 11, lines 49-50) by selectively firing some nozzles of a subset of commonly sized nozzles (heating elements 604; col. 11, lines 3-12).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to selectively fire some nozzles of a subset of commonly sized nozzles to achieve a target mean drop volume into the invention of Lesniak. The motivation for doing so, as taught by Mackenzie et al., is to eject a fluid having a drop weight that meets the ultimate image quality specifications (col. 11, lines 49-53).

Claims 10 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lesniak in view of Yuan et al. (US 5609919).

Regarding claims 10 and 21:

Lesniak discloses all claimed limitations except that the plurality of nozzles is arranged on the die so that large nozzles are pseudorandomly intermixed with small nozzles.

However, Yuan et al. disclose a plurality of nozzles (nozzle openings 16e and 16g) arranged on a die (disc 15e) so that large nozzles are pseudorandomly intermixed with small nozzles (Fig. 2f).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize large nozzles that are pseudorandomly intermixed with small nozzles into the die of Lesniak. The motivation for doing so, as taught by Yuan et al., is to allow variably sized droplets to be produced with a tailored size and flux distribution (col. 6, lines 49-52).

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lesniak (US 5387976) in view of Tachihara et al. (US 6447088 B2).

Regarding claim 23:

Lesniak discloses a fluid ejection device comprising:

a die (ink-jet printhead 40) including a plurality of nozzles (nozzles 42) variously configured according to a predetermined intended distribution (the distribution shown in Fig. 5), the plurality of nozzles having a target mean drop volume (desired drop-volume) and an actual mean drop volume (inherent drop-volume); and

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a control system (ink-jet printhead controller 62) configured to set the actual mean drop volume of the die to the target mean drop volume (col. 7, lines 62-67) by selectively firing selected nozzles of the die (col. 8, lines 2-6 show that each drop is modified during printing; col. 4, lines 41-44 show that nozzles are selectively driven during printing; thus the nozzles that are selectively driven during printing are all modified).

Lesniak does not expressly disclose that the nozzles are configured with various intended sizes, wherein the intended size of each nozzle is selected according to a predetermined intended distribution that defines at least a boundary interval of intended nozzle sizes and a probability distribution of intended nozzle sizes.

However, Tachihara et al. disclose nozzles (discharge ports) configured with various sizes (Fig. 8), wherein the size of each nozzle is selected according to a predetermined distribution (the distribution shown in Fig. 8) that defines at least a boundary interval of nozzle sizes (col. 7, lines 11-13 show that the nozzles are between 13 and 28 microns in size) and a probability distribution of nozzle sizes (the distribution shown in Fig. 8).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize nozzles configured with various sizes into the invention of Lesniak. The motivation for doing so, as taught by Tachihara et al., is be able to discharge ink droplets having different sizes, and to achieve gradation recording of a high picture quality (col. 2, lines 58-61).

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lesniak in view of Tachihara et al., as applied to claim 23 above, and further in view of Raman et al. (US 6655755 B1).

Regarding claim 25:

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Lesniak as modified by Tachihara et al. disclose all claimed limitations except that the nozzles are configured according to a normal distribution of nozzles sizes.

However, Raman et al. disclose that it is common for inkjet printheads to have nozzles configured according to a normal distribution of nozzle sizes (col. 2, lines 55-58 and Fig. 1).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to provide nozzles that are configured according to a normal distribution of nozzle sizes into the invention of Lesniak as modified by Tachihara et al. The motivation for doing so, as taught by Raman et al., is to produce the printhead in high volume (col. 2, lines 52-58).

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lesniak as modified by Tachihara et al., as applied to claim 23 above, and further in view of Mackenzie et al. (US 6808241 B2).

Regarding claim 29:

Lesniak as modified by Tachihara et al. disclose all claimed limitations except setting the actual mean drop volume of the die to the target mean drop volume by selectively firing nozzles in a subinterval of intended nozzle sizes.

However, Mackenzie et al. disclose setting an actual mean drop volume of the die to a target mean drop volume (1-2 nanograms; col. 11, lines 49-50) by selectively firing some nozzles of a subset of commonly sized nozzles (heating elements 604; col. 11, lines 3-12).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to selectively fire some nozzles of a subset of commonly sized nozzles to achieve a target mean drop volume into the invention of Lesniak as modified by Tachihara et al. The motivation

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for doing so, as taught by Mackenzie et al., is to eject a fluid having a drop weight that meets the ultimate image quality specifications (col. 11, lines 49-53).

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lesniak as modified by Tachihara et al., as applied to claim 23 above, and further in view of Yuan et al. (US 5609919).

Regarding claim 30:

Lesniak as modified by Tachihara et al. disclose all claimed limitations except that the plurality of nozzles are arranged on the die so that large nozzles are pseudorandomly intermixed with small nozzles.

However, Yuan et al. disclose a plurality of nozzles (nozzle openings 16e and 16g) arranged on a die (disc 15e) so that large nozzles are pseudorandomly intermixed with small nozzles (Fig. 2f).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to utilize large nozzles that are pseudorandomly intermixed with small nozzles into the die of Lesniak as modified by Tachihara et al. The motivation for doing so, as taught by Yuan et al., is to allow variably sized droplets to be produced with a tailored size and flux distribution (col. 6, lines 49-52).

Claims 36, 41, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tachihara et al. (US 6447088 B2) in view of Raman et al. (US 6655755 B1).

Regarding claim 36:

Tachihara et al. disclose a printhead die comprising:

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a first group of nozzles (discharging ports 511) having a first nozzle size (28x28 microns; col. 7, lines 11-13); and

a second group of nozzles (discharging ports 512) having a second nozzle size different from the first nozzle size (22x22 microns; col. 7, lines 11-13);

wherein a number of the first group of nozzles and the second group of nozzles are determined according to a predetermined distribution (the distribution of Fig. 8).

Tachihara et al. do not expressly disclose that a number of the first and second groups of nozzles are determined according to a normal distribution.

However, Raman et al. disclose that it is common for inkjet printheads to have nozzles configured according to a normal distribution of nozzle sizes (col. 2, lines 55-58 and Fig. 1).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to provide nozzles that are configured according to a normal distribution of nozzle sizes into the invention of Tachihara et al. The motivation for doing so, as taught by Raman et al., is to produce the printhead in high volume (col. 2, lines 52-58).

Regarding claim 41:

Tachihara et al. also disclose a third group of nozzles (discharging elements 513) having a third nozzle size different than both the first and second nozzle size (17x17 microns; col. 7, lines 11-13).

Tachihara et al. do not expressly disclose that a number of the third group of nozzles is determined according to a normal distribution.

However, Raman et al. disclose that it is common for inkjet printheads to have nozzles configured according to a normal distribution of nozzle sizes (col. 2, lines 55-58 and Fig. 1).

Regarding claim 42:

Tachihara et al. also disclose that a location of each of the first group of nozzles and each of the second group of nozzles is determined based upon the predetermined distribution (the distribution of Fig. 8).

Allowable Subject Matter

Claims 6, 7, 17, 18, 27, and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 6 contains allowable subject matter since the prior art of record does not teach a fluid ejection device comprising a subset of nozzles sized larger than others of the plurality of nozzles, and wherein the controller decreases the actual mean drop volume to the target mean drop volume by selectively firing nozzles of the subset in combination with other features and limitations of claim 6.

Claim 7 contains allowable subject matter since the prior art of record does not teach a fluid ejection device comprising a subset of nozzles sized smaller than others of the plurality of nozzles, and wherein the controller increases the actual mean drop volume to the target mean drop volume by selectively firing nozzles of the subset in combination with other features and limitations of claim 7.

Claim 17 contains allowable subject matter since the prior art of record does not teach a fluid ejection system comprising a subset of nozzles sized larger than others of the plurality of nozzles, and wherein the controller decreases the actual mean drop volume to the target mean drop volume by selectively firing nozzles of the subset in combination with other features and limitations of claim 17.

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Claim 18 contains allowable subject matter since the prior art of record does not teach a fluid ejection system comprising a subset of nozzles sized smaller than others of the plurality of nozzles, and wherein the controller increases the actual mean drop volume to the target mean drop volume by selectively firing nozzles of the subset in combination with other features and limitations of claim 18.

Claim 27 contains allowable subject matter since the prior art of record does not teach a fluid ejection device comprising a control system that decreases the actual mean drop volume to the target mean drop volume by selectively firing nozzles sized in the subinterval of large nozzles sizes in combination with other features and limitations of claim 27.

Claim 28 contains allowable subject matter since the prior art of record does not teach a fluid ejection device comprising control system that increases the actual mean drop volume to the target mean drop volume by selectively firing nozzles sized in the subinterval of small nozzle sizes in combination with other features and limitations of claim 28.

Response to Arguments

Applicant's arguments with respect to claims 1, 4, 8, 9, 11, 12, 15, 19, 20, 22, 23, 29, 31, 36, 39, 41-43, and 45 have been considered but are moot in view of the new ground(s) of rejection.

Regarding claims 10, 21, and 44, applicant argues that Yuan discloses nozzle openings having a "tailored size and flux distribution," and that having *tailored* sized openings precludes Yuan from meeting the limitation of "pseudorandom intermixing" of nozzle sizes. However, manufacturing of nozzles requires that the nozzles have a predetermined – or tailored – size. Therefore, since Yuan discloses nozzle openings with a variable mix of opening sizes (also see Figure 2f), the claimed limitation is properly met.

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Regarding claim 25, applicant argues that Raman does not disclose "a plurality of nozzles configured with various intended sizes, wherein the intended size of each nozzle is selected according to a predetermined intended distribution." In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Instead, the Raman reference was used only to show that a typical inkjet printhead has nozzles configured according to a normal distribution of nozzle sizes, as shown in lines 55-58 of column 2.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Communication with the USPTO

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shelby Fidler whose telephone number is (571) 272-8455. The examiner can normally be reached on MWF 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vip Patel can be reached on (571) 272-2458. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sf 2. Fidler 11/2/06

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STEPHEN MEIER
SUPERVISORY PATENT EXAMINER